marked depression in the curves at the age of from thirteen to fourteen years. Another noteworthy piece of work, recorded in the same number, is that by Dr. Scripture and Mr. H. F. Smith, which deals with the highest audible tones. The general result is that the pitch of the highest note varies directly and almost proportionally with the intensity. It is also shown that the limit of audibility is much higher when reached by descent from more rapid inaudible vibrations, *i.e.* proceding from silence to sound, than it is when reached by ascending from less rapid audible vibrations, *i.e.* proceding from sound to silence.

THE ninth part of "The Natural History of Plants"—the English edition of Prof. Kerner's admirable "Pflanzenleben"—has been published by Messrs. Blackie and Son.

MESSRS. A. AND C. BLACK have published the hird part of "A Dictionary of Birds," by Prof. Alfred Newton, F.R.S. The part extends from "Moa" to "Sheathbill." We propose to review the complete work when the fourth (and last) part has been issued.

"WEBSTER'S PRACTICAL FORESTRY," published by Messrs. Rider and Son, has reached a second edition. We reviewed the work when it first appeared (NATURE, vol. xlix. p. 526), and it is only necessary to add to the remarks then made that the author has enlarged the volume, thus increasing its value as a practical and popular handbook on the rearing and growth of trees.

THE second volume of Mr. Boulenger's "Catalogue of the Snakes in the British Museum," which has just been issued, concludes the account of the Aglyphodont Colubrine Snakes, and gives descriptions of 427 species, which are represented in the collection by 2528 specimens. We understand that the MS. of the third and concluding volume of this important work is nearly ready for press.

THE December number of the *Journal* of the Royal Microscopical Society has just been received. It contains a paper by Mr. F. Chapman, on the Foraminifera of the Gault of Folkestone (part vii.), and a description of a simple method of measuring the refractive indices of mounting and immersion media, by Mr. E. M. Nelson. The invaluable summary of current researches in zoology, botany, microscopy, &c., takes up the chief part of the journal.

WE note the commencement of vol. xxx. of the meteorological publications of the Manila Observatory. The *Bulletin* for the year 1894 is in a large quarto form, which is much more convenient in size than its predecessors. In addition to a good summary of the weather over the Philippine Islands, the work contains hourly observations for Manila, and observations taken twice daily at a number of secondary stations, together with rainfall and other maps.

MESSRS. WHITTAKER AND CO. will issue the first number of a new science weekly on January 5. The new journal will embody the combined features of *The Technical World* and *Science and Art*, two periodicals which have hitherto appeared as separate organs. It will appeal to all persons interested in the progress of art, science, and technology from an educational point of view. In addition to current news, the journal will contain articles in all the departments of pure and applied science and art.

A FINE geological map of Alabama, drawn on a scale of an inch to ten miles, has been prepared and issued by the Geological Survey of that State. The map is accompanied by a very useful explanatory chart, showing, in four parallel columns, (1) the names, synonyms, classification, and common fossils of the formations; (2) the thickness, lithological and topographical characters, area and distribution; (3) useful products; (4) soils, characteristic timber growth, agricultural features. By means of this chart and the coloured map, the geological record of Alabama can be read by any one.

WE have received from Dr. A. von Danckelman, an excerpt paper from vol. vii. of "Mittheilungen aus den deutschen Schutzgebieten," containing some valuable meteorological observations made by Dr. Steinbach, during the year 1893, at Jaluit, an island in the North Pacific. The station is situated in 5° 55′ N. lat. and 169° 40′ E. long., and is only five feet above mean sea-level. A Richard barograph was sent out by the Deutsche Seewarte in 1892, but the vessel was wrecked on approaching the island; another was supplied, and records were commenced on January 1 last. The observations for 1893 show that the air temperature is exceedingly uniform, the yearly range only amounting to 22°; the absolute maximum was 92°·8 in November, and 70°·7 in September. Cloud is very prevalent, there only being six clear days during the whole year. Rain falls almost daily, there being 343 wet days during 1893, the total fall being 182 inches; the greatest fall in twenty-four hours was 4·5 inches. Thunderstorms are not very frequent; there were only thirty-two in the year in question, but it is noteworthy that the majority occur in the forenoon, to an extent which has, we believe, not been observed at any other station.

THE additions to the Zoological Society's Gardens during the past week include a Bonnet Monkey (*Macacus sinicus*) from India, presented by Mr. J. Hussey; two Red-eared Bulbuls (*Pycnonotus jocosus*) from India, presented by Brigade-Surgeon Lieut.-Colonel E. F. Drake Brockman; a Cape Bucephalus (*Bucephalus capensis*), a Rhomb-marked Snake (*Psammophylax rhombeatus*) from South Africa, presented by Mr. J. E. Matcham.

OUR ASTRONOMICAL COLUMN.

A NEW SHORT PERIOD VARIABLE.—The possible variability of *d* Serpentis was suggested some time ago by the Potsdam photometric work, and the variation has now been confirmed by Mr. Yendell (*Astronomical Journal*, No. 331). Fifty observations made by him between August 5 and November 4 of last year indicate a variation from magnitude 5·0 to 5·7 in a period of not far from 8·7 days. The form of the light-curve appears to resemble that of β Lyræ, though this is not yet certainly established. There appear to be two maxima, one at 2·2 days, and the other at 6·2 days from the principal minimum, while there is a secondary minimum of about magnitude 5·5 at 4·3 days from principal minimum. Mr. Yendell suggests the provisional elements

1894, August 7·6 (G.M.T.) + 8d.·7 E.

The new variable is chiefly of interest in the probable resemblance of its light-curve to that of β Lyræ. Notwithstanding the very detailed investigations of the spectrum changes in the latter variable, which have been recently made at Harvard, Potsdam, Pulkowa, Stonyhurst, and Kensington, the cause of the variability is by no means completely understood. In this case the spectrum is a complicated one, consisting of bright lines as well as dark ones, and the Kensington photographs have shown that there are two distinct sets of the latter. According to the Draper catalogue, however, the spectrum of *d* Piscium is of the Sirian type, and no mention is made of bright lines. It may be that a complete study of the simpler spectrum of this star will throw some light on the origin of the variability in β Lyræ, and possibly also on the causes which produce other kinds of continuous variability in short periods.

The position of the star for 1900 is

R.A. 18h. 22m., Decl. + 0° 8′.

DOPPLER'S PRINCIPLE.—The verification of Doppler's principle has hitherto depended upon comparisons of the spectroscopically measured velocities in the line of sight of Venus, and of the sun's limb with their known velocities, and upon the

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consistency of the measured velocities of stars when due allowance is made for the varying effect of the earth's movement. Dr. Belopolsky, however, has recently suggested a method (*Astr. Nach.* No. 3267) of demonstrating the principle by a laboratory experiment. Imagine two cylinders with axes parallel, on which are arranged vertically two sets of small mirrors, *a*, *b*, *c* . . ., *m*, *n*, *o* . . . The mirrors are inclined so that a ray of light falling on *a* is reflected to *m*, back again to *b*, then to *n*, and so on, finally being directed to the slit of the spectroscope. If now the cylinders be set in rapid rotation, in opposite directions, the effects of the mirrors will be to accelerate or retard the velocity of the ray of light according to the directions of movement. Figures are given which indicate that measurable displacements may be obtained by employing cylinders of from 0·25 to 0·7 m. diameter, with ten or twenty mirrors, making from eighty to twenty revolutions per second. With cylinders half a metre in diameter, making eighty revolutions per second, and having twenty mirrors, the equivalent of a velocity of five kilometres per second in the line of sight is obtained, and with modern instruments there would be no difficulty in observing the effects of such a movement. It is pointed out that dynamos already make from seventy to eighty revolutions per second, and if sufficient care be taken in the construction of the cylinders, the experiment does not seem to present insuperable difficulties.

"THE ASTROPHYSICAL JOURNAL." This is the title under which *Astronomy and Astro-Physics* will appear in future. The University of Chicago has purchased that journal, and arrangements have been made to carry it on under the editorship of Profs. Hale and Keeler, assisted by Profs. Ames, Campbell, Crew, Frost, and Wadsworth, and a number of associate editors, five of whom represent Germany, Great Britain, France, Italy, and Sweden. The scope of the new publication will be quite as broad as that of *Astronomy and Astro-Physics*, for all problems and investigations of modern physical astronomy will be dealt with. The journal will, in fact, represent the common ground of physics and astronomy, and it should therefore be appreciated by the physicist as much as by the astronomer. Workers in astronomical physics should be gratified that their science has progressed sufficiently to need a special organ to be devoted to its interests. *Popular Astronomy* will be continued as heretofore, and will appeal to all amateurs, teachers and students of astronomy, and others interested in celestial science. This journal will be practically the old *Sidereal Messenger*, and the *Astrophysical Journal* will be the realisation of Prof. Hale's original plan of a periodical for workers in the domain of the new astronomy.

ELLIPTICAL ORBITS.—A little pamphlet on elliptical orbits, by Mr. H. Larkin, has been published by Mr. Fisher Unwin. If it should induce any student of astronomy to construct for himself the curves in which the apparent orbit of a binary star, as we see it, may be resolved, it will serve one useful purpose, and probably the only one. For it is to be hoped that the same student will not embrace the theory of formation of binary stars as given here, wherein they are made to result from the explosion of one larger star. There are many other strange things taught, of which Newton never dreamed, and which no one capable of reading Newton would ever have stated. Perhaps the most singular is the suggestion of "precarious equilibrium" that would accompany motion in a circular orbit. "Precarious equilibrium" is a curious term, but the context seems to suggest that some catastrophe or disaster would result from such a condition. The author does not seem to have realised that there is no sudden and violent change between an ellipse of small eccentricity and a circle, and that in the solar system there are instances in which the eccentricity (if existing) is so slight that the motion can be conveniently considered as circular.

FORESTRY IN NATAL.[1]

NATAL lies between latitude 28° and 31° S. The climate of the coast is almost tropical, owing to a warm current from the equator. Mangrove trees grow along the coast, and sugar-cane and tropical Indian fruit trees are cultivated there. The land ascends rapidly inland, and the capital, Pietermaritzburg—or Maritzburg, as it is usually called, at fifty miles from the coast—is at 2275 feet above sea-level, and possesses an appreciably mild climate.

The colony is bordered on the west by the Kathlamba or Drakensberg, a mountain chain attaining altitudes which exceed 9600 feet, and separating Natal from the Transvaal, the Orange Free State, and Basuto-land. These mountains form the eastern boundary of the high South African plateau, which is drained by the Orange River and its tributaries.

Natal is scantily populated, containing 18,755 square miles, with 532,000 inhabitants, of whom 38,000 only are Europeans. Most of the latter are English who came by sea and founded Port Durban, but a few are descended from the Dutch Boers who came from the west in 1838–42 and founded Maritzburg. Natal has been an English colony since 1843, when the territory only included 3000 native inhabitants, but their numbers rose rapidly to 100,000 in 1845, and to 400,000 in 1883. They are mostly Zulus in the north, and Kaffirs in the south of the colony.

Much greater progress could have been made in Natal, in trade, agriculture, and manufactures, if it had been connected by roads and railways with the Transvaal and Orange States. The Cape railway, 650 miles long, from Cape Town to Kimberley, with express trains doing the distance in thirty-six hours, has long been constructed, and in 1893 this railway was extended to the Transvaal gold mines at Johannesberg.

In 1880 a railway was constructed from Durban to Maritzburg, but only recently has it been pushed further inland, and it now reaches the confines of the colony. Its further extension to Johannesburg is most important for the future prosperity of Natal. About one and a half years ago a railway was made from Ladysmith in Natal to Harrismith in the Orange State. Natal is at present short of funds, and this may partly explain why, having made a good start in forest conservancy, the Colonial Government has not had the resolution to persevere in it.

The Cape Colony has had for some time a good forest administration which was organised by a French forest officer, Count Vasselot de Regné, Conservator of Forests in Algiers, and Mr. D. E. Hutchins is now Chief Conservator of Forests at Cape Town. He was trained at Nancy for the Indian forest service, and left it for service at the Cape in 1883. Mr. Fourcade, of the Cape forest service, was employed in Natal for nine months in 1889, and has written a very valuable paper on the Natal forests, but he declined to quit the Cape service permanently for that of Natal, and was succeeded in 1891 as chief forest officer there by Mr. Schopflin, a Baden forest officer.

The work he undertook of organising a forest department in Natal was full of difficulty, especially as the forest revenues were not expected to cover the expenditure for a number of years. Irrespectively of the continual clearance of forests for the extension of agriculture, forest fires, unregulated grazing, and wasteful timber felling have so exhausted the Natal forests that the areas still covered with brushwood and forest are widely scattered over the country, and only a small percentage of them is still State property.

From the coast to altitudes of about 975 feet, with an average annual temperature of 67°–71°, the forest consists of numerous species belonging to the tropical flora. The woods are not more than 30–60 feet high, but something might be made of them, as several species yield valuable timber. Unfortunately nearly all the coast forests are now private property.

In a central zone ranging in altitude between 980 and 3450 feet with an average annual temperature of 59°–67° F., extensive tracts are covered with so-called mimosa scrub, formed of several species of *Acacia;* these woods are very thinly stocked, and contain a tall grass undergrowth. The acacias bear plenty of seed, and young growth exists, but is continually being destroyed by the annual grass fires. If only protection could be afforded to these forests against fire, as has been done for the last thirty years in British India, they could be worked profitably with short rotations—twenty-four years, according to Mr. Fourcade; it is, however, probable that most of this area will be cleared for agriculture.

The present area of the coast and acacia forests is estimated at 196,000 acres of State forest, and 1,645,000 acres in private hands.

In the higher zone, from 3450 feet up to 9600 feet, with a temperate climate, and an average annual temperature of 52°–59°, the most valuable forests are situated, but they are

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[1] Translation of a paper by Sir Dietrich Brandis, K.C.I.E., F.R.S., in the *Forst und Jagd Zeitung.*

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